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(54) **Method of marking rubber goods**

(57) A rubber surface, for example the rubber surface of a floor mat having a pile surface and a rubber backing, can be marked in a water-resistant and abrasion-resistant manner by means of a sublimable transfer dye applied in a dry-heat transfer printing process. The resulting marking can be a code of letters and/or numbers and is used to identify the mats. The markings are particularly useful where the mats are periodically collected and cleaned as part of a laundry service.

Method of marking rubber goods

The present invention relates to the marking of rubber surfaces, especially surfaces of rubber goods in sheet form such as floor mats having a backing surface of rubber.

It is known to print patterns on textiles, composed
5 for example of nylon, polyester or natural fibres, by transfer printing using a sublimable dye. In such a process the desired pattern is first printed on a transfer sheet of paper or the like, for example by silk screening from an aqueous solution, using the sublimable dye which has
10 to be chosen so that it is compatible with the textile to be dyed and to have a greater affinity for it than for the transfer sheet. After any necessary drying operation the transfer sheet is placed in contact with the textile to be printed and is then heated to vaporise the dye and
15 transfer it to the textile material where it becomes fixed.

We are not aware that such transfer printing techniques have hitherto been used commercially for printing on rubber surfaces, and the dyes currently supplied commercially for transfer printing are supposed to be specific to the
20 textile material for which they are designed, mostly polyester.

We have now found that transfer printing dyes designed for use with polyester can also be used to mark rubber surfaces by a transfer printing technique.

25 According to a first aspect of the present invention a process for marking a rubber surface comprises printing a pattern on the surface by a transfer printing technique using a transfer dye designed for transfer printing of polyester textile material.

30 The transfer printing has been carried out using the following transfer dye formulations, in which parts are by weight.

Formulation 1

DYTRAN BLACK K133 (supplied by 66 parts

Dytran Ltd)

Dye base 33 parts

This formation gave a black colouration on a white rubber

5 patch

Formulation 2

TRANSPURE PINK (supplied by
Tennants Lancashire Ltd) 54.0 parts

10 YELLOW FAST G125% (supplied
by Hollidays Dyes & Chemicals
Ltd) 26.5 parts

BASF YELLOW 146 (supplied by
Cheadle Colour Chemicals Ltd) 32.0 parts

OIL SOL BLUE (supplied by
Williams Ltd) 67.5 parts

15 TRANSPURE VTF BLUE (supplied
by Tennants Lancashire Ltd) 118.8 parts

717 parts

This formulation gave a grey/green marking on a white
rubber patch

Formulation 3

20 TRANSPURE PINK 84.0 parts

YELLOW FAST G 125% 25.6 parts

BASF YELLOW 146 156.0 parts

OIL SOL BLUE 58.5 parts

TRANSPURE VTF BLUE 98 parts

25 Dye base 550 parts

Water 100 parts

This formulation gave a grey/green marking on a white
rubber patch.

30 The dye base used in each formulation was a mixture
of water and thickener which rendered the dye dispersion
silk screen printable.

In each case the transfer printing was achieved by silk screening a marking onto a paper transfer sheet, bringing the paper sheet into contact with a white rubber label or patch on a synthetic rubber (NBR) surface and
5 applying heat to vaporise the dye (160-200°C for 0.5-3mins). For best results two passes were used because the penetration after a single pass was relatively poor. Results obtained with Formulation 1 were superior in quality to those obtained with Formulations 2 and 3 and the markings
10 resulting from its use were abrasion-resistant and wash-fast.

In carrying out the process according to the invention it is desirable to provide the rubber surface with a white or lightly-coloured area so that a dark, e.g.
15 black, marking can be applied. The rubber used can be a natural rubber or a synthetic rubber, for example a nitrile rubber. The heating temperature used is preferably in the range 150-250°C although the optimum temperature will be dependent on the dye used. The heating period
20 will depend on the temperature, shorter time being associated with higher temperatures, but periods of 0.5-5 minutes may be satisfactory.

The transfer dye used will be one which in the formulation employed has an affinity for the rubber surface,
25 for example as demonstrated by simple preliminary experiments with a test rubber surface, and may be one which is also suitable for use with polyester textile materials, although other transfer dyes may be used where appropriate. Desirably a dye capable of producing a black colour or
30 other dark colour on the textile or other surface is used, although such a dye will not necessarily produce the same colour on the rubber surface. Preferably a single dye is used but it is also possible to use a dye mixture, and in such a mixture not all the dye components need
35 have equal affinity for the rubber surface.

In a second aspect the present invention relates to the identification of rubber mats, especially washable rubber floor mats. It has application in particular to dust control mats comprising a rubber backing and a pile surface bonded to the backing usually through an intermediate tissue. Such mats are normally supplied by their owners on loan or lease to shops, offices, factory premises and the like for use on floors and, when they become soiled, they are collected, laundered and resupplied. It is desirable to have some means of identifying individual mats of this type in a permanent manner which is not destroyed during the laundering operation.

Previous proposals for marking washable rubber floor mats have involved the use of marker pens to apply inks, but these have not proved to be sufficiently durable over repeated laundering, and the use of soldering irons or the like to burn or brand a permanent mark into the rubber, but this tends to weaken the mat and is disliked by users. According to the invention there is provided a method of identifying a rubber mat comprising applying to the rubber surface by transfer printing a transfer dye in a predetermined identifying pattern, preferably a code of letters and/or numbers.

Such a method is simple to carry out and can be carried out by the mat manufacturer or by the subsequent user or owner, for example before supply of a dust control mat on loan or lease or in conjunction with a laundering operation. For use by the subsequent owner or user a special kit can be supplied.

The invention therefore also provides a kit for use in the method comprising a set of preformed letters and/or numbers and/or other designs composed of a transfer printing dye on a substrate, and a rubber mat having a patch for receipt of the identifying pattern.

The mat rubber may be natural or synthetic rubber and may be any of the rubbers conventionally used for dust control mats. The mat may be a dust control mat and may or may not have a pile fabric, e.g. of polyester, on its surface, but other types of rubber floor mat may be used. The mat may be formed with a suitable area or patch designed to receive the marking and this area may be made smoother than the remainder of the mat or may be given a different colour, for example white or a light colour instead of the conventional black.

The set of preformed letters, numbers or other designs may be produced by silk screening the dye in an aqueous or other convenient solution onto a paper substrate, allowing the paper to dry and then if desired cutting the paper or other substrate to separate the individual items of the set.

To apply a particular code to a mat the appropriate items of the set are laid on the mat with the transfer printing dye in contact with the mat surface and heat applied to the substrate on which the dye lies, for example by a heated press or other item applying a low pressure. This causes the dye to vaporise (sublime) and transfer to the mat surface where it forms a totally wash-fast and abrasion-resistant marking. The resulting markings remain clearly visible even after numerous launderings of the mat.

In further aspects, therefore, the invention provides:

a) A method of cyclically cleaning a plurality of groups of fabric pile rubber-backed mats, which comprises separately marking an exposed area of the rubber backing of each mat with a transfer dye thermally bonded thereto in a pattern characteristic of that group of mats, cleaning the mats without regard to the markings and separating the mats after each cleaning operation into at least two

groups on the basis of the bonded back markings thereon;
and

b) A dust control mat service, which involves supplying at least one fabric pile rubber-backed mat to each user of the service and periodically collecting, cleaning and resupplying the mats to the users of the service, wherein a characteristic marking is assigned to each user, the respective marking is bonded to an exposed area of the rubber back of each mat destined for that user by means of a thermally-active transfer dye, and wherein a plurality of mats with different markings are cleaned in a given cleaning operation and following cleaning, the mats are sorted for return to the respective users on the basis of the bonded back markings thereon.

CLAIMS

1. A method of identifying a rubber mat comprising applying to the rubber surface by transfer printing a transfer dye in a predetermined identifying pattern.

2. A method as claimed in claim 1, wherein the
5 pattern is a code of letters and/or numbers.

3. A method of cyclically cleaning a plurality of groups of fabric pile rubber-backed mats, which comprises separately marking an exposed area of the rubber backing of each mat with a transfer dye thermally bonded
10 thereto in a pattern characteristic of that group of mats, cleaning the mats without regard to the markings and separating the mats after each cleaning operation into at least two groups on the basis of the bonded back markings thereon.

4. A dust control mat service, which involves
15 supplying fabric pile rubber-backed mats to users of the service and periodically collecting, cleaning and resupplying the mats to the users of the service, wherein a characteristic marking is assigned to each user, the
20 respective marking is bonded to an exposed area of the rubber back of each mat destined for that user by means of a thermally-active transfer dye, and wherein a plurality of mats with different markings are cleaned in a given cleaning operation and, following cleaning, the
25 mats are sorted for return to the respective users on the basis of the bonded back markings thereon.

5. A kit for use in a method of identifying rubber mats by application of a predetermined identifying pattern, comprising a set of preformed numbers and/or letters
30 and/or other designs composed of a transfer printing dye on a substrate, and a rubber mat having a patch for receipt of the identifying pattern.

6. A process for marking a rubber surface comprising printing a pattern on the surface by a transfer printing technique using a transfer dye designed for transfer printing of polyester textile material.

- 5 7. A process as claimed in claim 6, wherein the transfer printing technique involves use of a temperature of 150 to 250°C.

Amendments to the claims have been filed as follows

1. A method of identifying a rubber mat comprising applying to the rubber surface by dry-heat transfer printing a sublimable transfer dye in a predetermined identifying pattern.
- 5 2. A method as claimed in claim 1, wherein the pattern is a code of letters and/or numbers.
3. A method as claimed in claim 1 or 2, wherein the mat is a dust control mat having a pile surface and a rubber backing, the pattern being applied to the back-
10 ing.
4. A method as claimed in any of claims 1 to 3, wherein the backing is provided with a patch designed for receipt of the dye pattern.
5. A process as claimed in any of claims 1 to 4,
15 wherein the transfer printing technique involves use of a temperature of 150 to 250°C.
6. A process as claimed in any of claims 1 to 5, wherein the rubber is a nitrile rubber.
7. A process as claimed in any of claims 1 to 6,
20 wherein the sublimable dye is a disperse transfer dye designed for transfer dye designed for transfer printing of polyester textile material.
8. A process as claimed in claim 7, wherein the dye comprises Oil Sol Blue (C.I. Disperse Blue 134 , 1,4-bis(isopropylamino anthraquinone)).
25
9. A method as claimed in any of claims 1 to 8, wherein a plurality of identical rubber mats are marked with different identifying patterns whereby they can be subsequently distinguished.

10. A method of cyclically cleaning a plurality of groups of fabric pile rubber-backed mats, which comprises separately marking an exposed area of the rubber backing of each mat with a transfer dye thermally bonded thereto in a pattern characteristic of that group of mats, cleaning the mats without regard to the markings and separating the mats after each cleaning operation into at least two groups in the basis of the bonded back markings thereon.

11. A dust control mat services, which involves supplying fabric pile rubber-backed mats to users of the service and periodically collecting, cleaning and re-supplying the mats to the users of the service, wherein a characteristic marking is assigned to each user, the respective marking is bonded to an exposed area of the rubber back of each mat destined for that user by means of a thermally-active transfer dye, and wherein a plurality of mats with different markings are cleaned in a given cleaning operation and, following cleaning, the mats are sorted for return to the respective users on the basis of the bonded back markings thereon.

12. A kit for use in a method of identifying rubber mats by application of a predetermined identifying pattern, comprising a set of preformed numbers and/or letters and/or other designs composed of a transfer printing dye on a substrate, and a rubber mat having a patch for receipt of the identifying pattern by dry-heat transfer printing.